No. 736,535. PATENTED AUG. 18, 1903.

O. A. MYGATT.

SHADE FOR ARTIFICIAL LIGHTS.

APPLICATION FILED APR. 14, 1900.

NO MODEL.

Fig. 1.

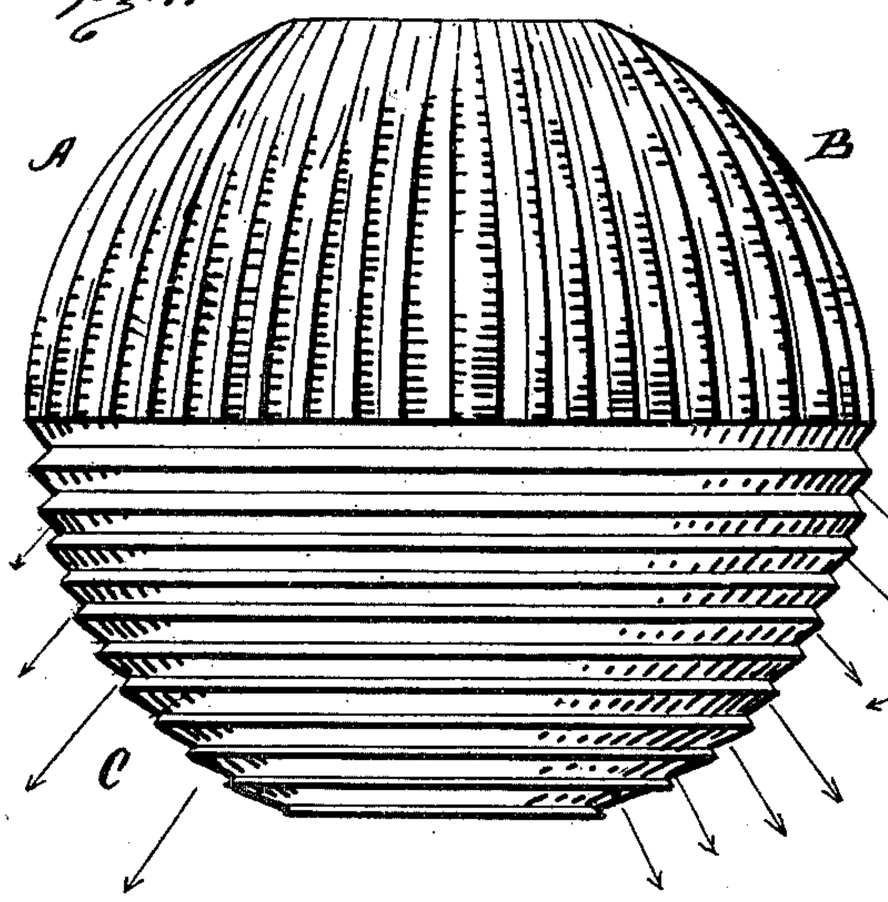


Fig. 2.

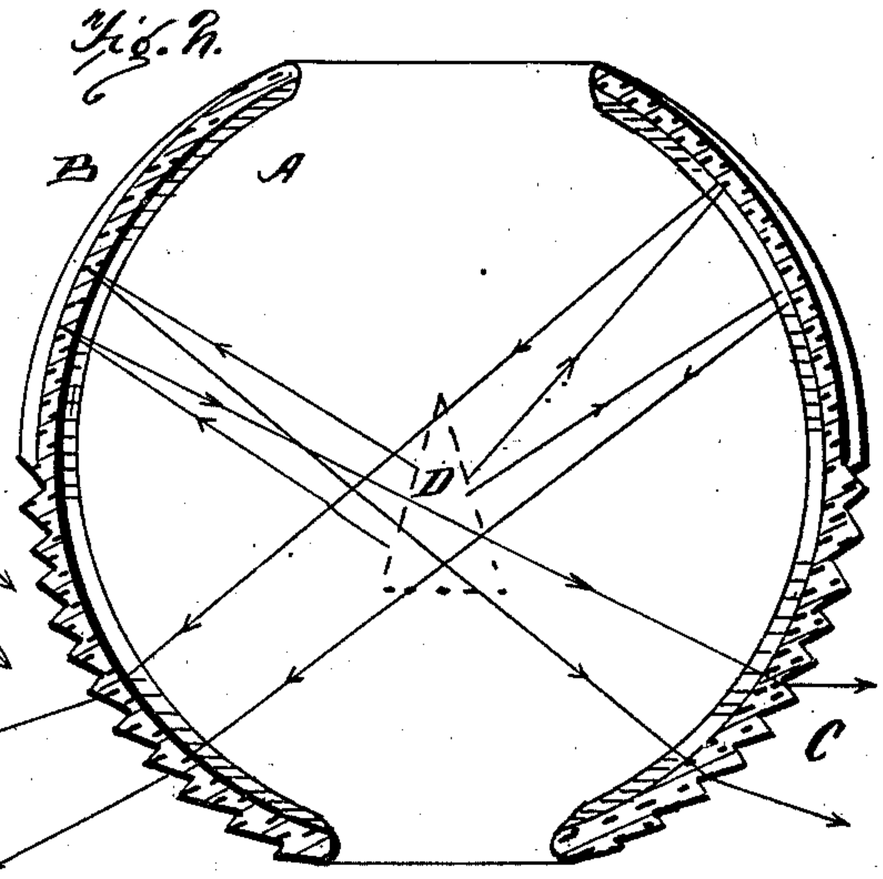


Fig. 3.

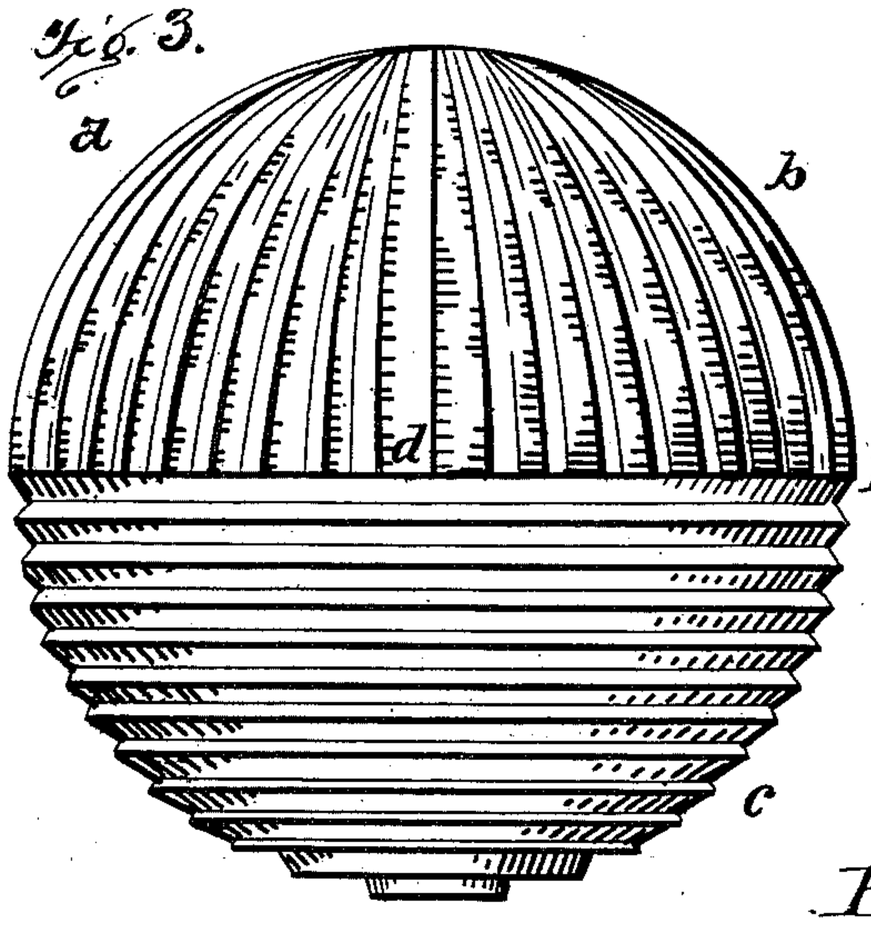


Fig. 4.

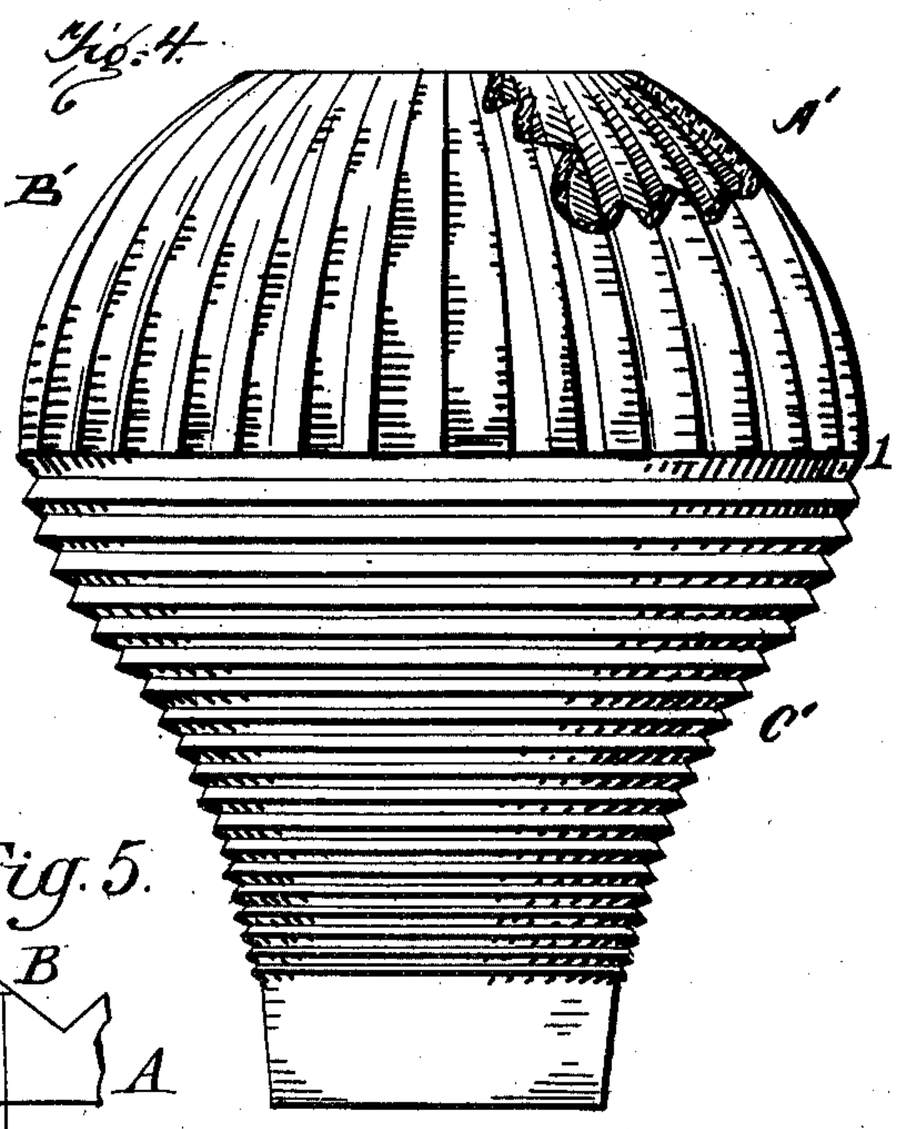
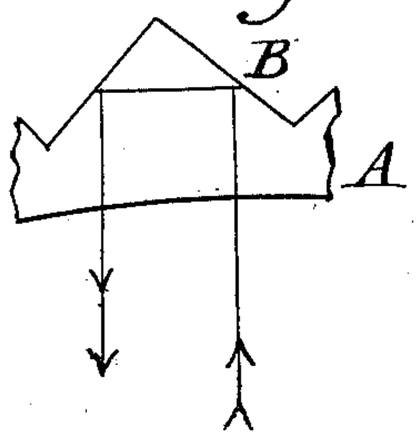


Fig. 5.



WITNESSES

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No. 736,535. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

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SHADE FOR ARTIFICIAL LIGHTS.

SPECIFICATION forming part of Letters Patent No. 736,535, dated August 18, 1903.

Application filed April 14, 1900. Serial No. 12,919. (No model.)

To all whom it may concern:

Be it known that I, OTIS A. MYGATT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Shades for Artificial Lights, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to shades for artificial lights, such being known as "lamp" shades or globes.

The object of the invention is to produce a shade or globe of transparent glass which shall have the capacity of concentrating a very large proportion of the light-rays which emanate from an artificial light in one general direction. For convenience of description I will consider the direction a downward direction.

If a hollow shade be made of transparent glass and the outer surface of such glass be covered with prisms, the effect of such shade and such prisms on rays of light emanating from a source of light at the center of such shade will depend on the form of the prisms, on the location of the prisms relatively to the light, and on the arrangement of the prisms with relation to each other and to the form of the shade on which they are formed. I avail myself of known laws of optics to construct shades of a character heretofore unknown, so far as I am informed and believe, and of great utility, as I have practically demonstrated; and my invention is hereinafter pointed out and claimed.

Figure 1 is a side elevation of a substantially spherical globe or shade embodying my invention, arrows showing the approximate direction of some light-rays. Fig. 2 is a central vertical section of same, showing also diagrammatically in dotted lines a supposed position of an interior light and by lines and arrows diagrammatically indicating the approximate direction of some of the light-rays. Fig. 3 is a side elevation of a modification, and Fig. 4 is a side elevation of an another modification. Fig. 5 is a diagram indicating the course of a light-ray to and from the reflecting-surfaces of an external reflecting-prism.

A, Figs. 1 and 2, denotes a shade of substantially spherical form and in the position it is supposed to occupy, and for convenience and distinctness of description the top, bottom, &c., of the shade will be supposed to be those portions occupying such relative positions in the drawings. The inner surface of the globe above the median or equatorial line is smooth and, as illustrated, is a segment of a sphere. The outer surface of the upper part of the hollow sphere is covered with prisms, which prisms are of regular form, bounded by curved lines radiating from the top or pole of the globe, such boundary-lines being meridional lines, as illustrated. Prisms of this character if arranged with their plane faces at angles approximating forty-five degrees to the line of the radiating rays of light may be made to reflect as much as eighty-five per cent. of the light. The angle of the outer plane surface of the prism largely determines the quantity of light which will be reflected, as well as the direction these rays will take. The diagram Fig. 5 illustrates the direction of reflection of a light-ray in passing from the interior of a globe to one of the reflecting-prisms B on the outer surface of the globe. Fig. 2 indicates in a general way the further direction of the light-rays.

As the upper surface of the shade illustrated is substantially a sphere or segment of a sphere, the tendency of the exterior reflecting-prisms will be to return the light-rays past or through the source from which they emanated, and instead of allowing the light-rays which are thrown upward from the source of light to continue upward they are largely reflected backward and downward. Thus these reflected rays take practically the same direction as the direct rays which emanate from the light and strike the inner surface of the lower part of the shade—that is, the part below the median line. Thus if three-fourths of the light which would otherwise go upward is reflected back it is obvious that the lower part of the shade receives on its inner surface seventy-five per centum more

light than would ordinarily be the case; but it should be apparent that by a slight departure from a true spherical form nearly all the light-rays which are reflected back from the upper half of the shade might be concentrated on a limited area, so that a small ring or band on the interior of the lower surface might receive two, three, or more times as much light as would normally reach such surface from the source of light—that is, the upper or reflecting part of the shade is practically a concave reflector and might easily be a parabolic reflector.

Now if the surface of the globe, Figs. 1, 2, 3, below the median line had the same character of external prisms as the prisms B it must be clear that the light would be again reflected back by these prisms and so thrown back and forth and practically wasted, since such prisms on the surface of a transparent glass shade of good quality permit only about fifteen per cent. of the light to pass directly through. An opaque reflector would be nearly as serviceable as such a shade.

The prisms C on the lower surface of the shade—that is, below the median line—are refracting or directing prisms. As indicated by the arrows in Fig. 2, these prisms are parallel and extend horizontally around the shade. The position of the external plane faces of these prisms largely determines the direction of the light-rays as they pass from the shade.

As indicated in Fig. 2, the prisms may be so formed as to deflect the rays toward a horizontal direction. The exact angle at which the faces of these prisms must be formed to deflect the light to best advantage in any given direction may be calculated by formulæ known to experts in this art. The practical commercial limitations are that the prisms must be such as can be molded on glass—that is, of such form as will deliver from the "molds"—since the cutting of the glass would be so expensive as to be practically prohibitory for most purposes.

Figure 1 shows by arrows that the prisms are intended to deflect the rays in a generally-downward direction. By such an arrangement a large proportion of all the light emanating from an artificial light may be concentrated into a small circle, and objects within that circle may receive several times as much light as would reach them from the direct rays of the source of light, and if the ribs C be formed to concentrate the rays upon a small area this small area may be lighted to the extent of two or three times as much.

In the form shown in Fig. 4 the part of the shade below the line 1 1 is externally concave in its vertical section. This form permits a very efficient arrangement of external deflecting-ribs C′. The light-rays which tend upwardly being reflected by ribs A′, as has been described, and the rays passing through the lower part of the ribs being concentrated by prisms C′, a very powerful illuminating effect may be produced on a limited area by a light of ordinary power. This capacity of my improved shade to act also as a lens gives it great value for illuminating in certain localities, as in picture-galleries, the windows of drug stores, jewelry stores, &c.

The globe *a*, Fig. 3, is almost a complete sphere. The reflecting-prisms *b* and deflecting-prisms *c* are formed on its outer surface. Only a small opening is needed for the insertion of an electric light, and such may be in any suitable location—say in the side opposite *d*.

Assuming the normal focus or area to which the light is directed to be downward, a slight rotation of the shade around a horizontal axis would focalize the light in another direction.

It should appear from the above statement that the shades described have the capability of concentrating the light-rays from an artificial light. The exact position at which the light can be focused and the area over which this focal concentration shall extend may be determined within close limits by the form of the shade and by the location of the external prisms thereof, and the whole device of transparent pressed glass can be made at low cost after the mold (which is rather expensive) has been produced.

I have referred to the "upper" and "lower" parts of the shades with reference to the positions illustrated in the drawings. This does not imply that the shades must always be used in such position. The "down" of the shades shown is the general direction of the light-rays from such shades when placed in position shown; but the shades may of course be turned to project light-rays in other direction than downward.

What I claim is—

1. A shade composed of a single piece of transparent glass having its upper surface practically covered by external prisms constructed to reflect the light inwardly, said prisms bounded by lines following the surface of the shade and radiating from the pole thereof, and having its lower outer surface substantially covered by deflecting-prisms arranged circumferentially, and across the lines of the reflecting-prisms, if produced.

2. A shade composed of a single piece of transparent glass having its upper outer surface practically covered by reflecting-prisms bounded by meridional lines, and having its lower outer surface practically covered by external refracting-prisms.

3. A shade composed of a single piece of transparent glass having on its upper outer surface reflecting-prisms, bounded by meridional lines, and on its outer lower surface refracting-prisms bounded by circumferential lines substantially as described.

4. A shade composed of a single piece of transparent glass, smooth on its upper inte-

rior surface and practically covered on its outer upper surface by reflecting-prisms bounded by meridional lines, and having its external lower surface practically covered by refracting-prisms, substantially as described.

5. A globular shade composed of one piece of transparent glass having its upper hemisphere provided with external reflecting-prisms, and having its lower hemisphere provided with external deflecting-prisms, said deflecting-prisms differing from each other in their deflecting character.

In testimony whereof I affix my signature in presence of two witnesses.

OTIS A. MYGATT.

Witnesses:

CHAS. K. DAVIES,

JOSEPH A. ARTHUR.